IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

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COMCAST CABLE COMMUNICATIONS, LLC, et al., Plaintiffs	:	CIVIL ACTION NO. 12-0859
v.	:	Philadelphia, Pennsylvania
	:	February 3, 2017
SPRINT COMMUNICATIONS COMPANY L.P., et al., Defendants	:	1:46 o'clock p.m.

AFTERNOON SESSION - DAY FIVE
BEFORE THE HONORABLE JAN E. DUBOIS
SENIOR UNITED STATES DISTRICT COURT JUDGE

- - -

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AFTERNOON SESSION

(The following occurred in open court at 1:46 o'clock p.m.)

THE DEPUTY CLERK: All rise.

(Jury enters.)

THE COURT: Good afternoon, everyone, please be seated. Mr. Goettle, you can continue your redirect.

ROBERT AKL, Plaintiff's Witness, Sworn.

REDIRECT EXAMINATION

BY MR. GOETTLE:

Q Good afternoon, Dr. Dwoskin. Can you put up PX-174? Dr. Dwoskin, do you recall during your cross --

MR. FINKELSON: He's your next witness.

THE COURT: This is Dr. Akl.

MR. GOETTLE: I apologize.

THE WITNESS: Go right ahead.

MR. GOETTLE: The jury will soon see that they look nothing alike.

BY MR. GOETTLE:

Q Dr. Akl, do you recall testimony during your cross regarding this chart, this exhibit and LDAP, LDAP?

A Yes.

Q Okay. Does Sprint's SMSEs and Sprint's MMSEs use LDAP?

A LDAP is the database -- LDAP is the name of the protocol of the database that's used in the messaging LDAP, which is

the database. So, the question was --

Q Do the -- I'll make the question better. Do the SMSEs and the MMSEs query the SPS or the messaging LDAP using the LDAP protocol?

A Yes.

Q Okay and what is shown on this chart with respect to that?

A This is the name of the protocol, so LDAP, as an acronym, stands for Lightweight Directory Access Protocol. So, this row is telling you that the -- it's specifying that LDAP is going to be the protocol that's going to be used in the subscriber database. That's what I would say based on what's written here.

Q So, is this showing that the messaging LDAP or the SPS is part of Sprint's messaging network?

A No.

Q Are the messaging LDAP in the past and now the SPS, are they part of Sprint's cellular network?

A Yes, they are and remain core network elements. It's the SPS is a core network element and even in Sprint's counsel's opening when he drew, in his opening, Sprint cellular network, he had the phone, he had the base station and he had a box that had the core network. He had four things in that box. One of them was the SPS, which is what the MLDAP became.

Q Okay, can we -- by the way, you mentioned the word query, that does query mean and why are you using that word?
A Oh, query just means ask, so when we look at the claim, Claim 1, if you recall the first limitation of Claim 1 and if you want to put it on the slide?
Q Actually, PX-2, Mr. Dow?
A Yes, this is fine. So, the method -- the claim starts, a method for inquiring and then you send an inquiry, so the word is query is kind of a like a derivation of the word inquiry. So, there is -- the inquiry that has to go from the messaging server to the cellular network, that question, that's the phone number that the messaging server sends to the cellular network. That's what I'm calling the query, the language in the claim is an inquiry.
Q Okay, thank you. Okay, can we put PX-174, back up. And now I'd like to direct your attention to the row that starts with PDR?
A Yes.
Q Were you asked about this during your cross-examination?
A Yes.
Q Do you see in that row, it says "this is an open wave SMS router that was used on the CDMA network."
A Yes.
Q When it says the open wave SMS router or now called the predestination router was used on the CDMA network, does that

mean it was a core network element of Sprint's cellular network?

A No.

Q Even though it's referring to the CDMA network?

A Correct.

Q Can you explain why?

A Yes. So, as we were describing -- the term, CDMA is and it's actually an acronym I typed in the binder, Code Division Multiple Access. So, that's the wireless access technology in Sprint. So, the term CDMA network is used very broadly to refer to the technology that Sprint uses in their cellular network, while I've seen language where you would say, you know, this is a CDMA network, this is a GSM network. It's really not a precise term where this is saying that this is a core network element based on the Court's construction of a cellular network. So, the two aren't -- that's not the case.

Q Okay, thank you. Do you recall during your cross-examination you were asked about your publications and whether your publications ever referred to a messaging network?

A Correct.

Q And do your publications, to your recollection, refer to a messaging network?

A No.

Q Why not?

A Because the -- two-thirds of my publications do deal with cellular communication and I'm focusing on the optimization in a cellular network. So, a lot of my work on second generation CDMA, third generation and now on LTE, deal with how do we make the network, the cellular network more efficient. So, the focus isn't on messaging.

Q During your cross examination, did Sprint's attorney show you any of your publications that show that what you're saying today and explaining to this jury today and yesterday, are inconsistent with what you've published in the past?

A He didn't show any publications. There is no inconsistency.

Q Okay, do you recall during your cross-examination, Sprint's lawyer, referring to your slide deck and you taking Sprint documents and annotating them in your slide deck?

A Yes.

Q Why did you do that?

A To help the jury, this is what I do as a professor. I take figures and I walk through them. I use Powerpoint with my students. Here, the Powerpoints look a little nicer because we have a graphic artist that helped me with the Powerpoints. Normally, they're not as good, but that's the purpose of a Powerpoint, is to help the audience understand the message.

Q Can you turn to, in Dr. Akl's slides, page 69? It's

PD-2-69. And this is, what we're showing here, the jury has seen and Sprint's counsel referred to it as the ice cream cone, I think, which is actually pretty good or snow cone? It actually does look like a snow cone, do you agree, Dr. Akl?

A Sure.

Q Is this -- this is a slide that you created out of what? What did you look at to create this slide?

A So, these are two Sprint documents. The first Sprint document, which is the bottom part and I had walked through that document. I walked through the components of that document in describing Sprint's cellular network. This came out of a different Sprint document and rightfully so, because it's describing Sprint's messaging network. And the point of putting them both on one slide isn't that one is above the other, it's both networks work together. It's to show that Sprint has a cellular network and Sprint has a messaging network and both networks communicate. You know, both of them is Sprint's telecommunications network or part of Sprint's telecommunications network. But as far as the Court's construction, we have the Court construction definition of what a cellular network is and this meets that definition. There are three things, again, you have the phone, the base station, tower, the base station controllers, that's the BSS and the core network elements. And we also

have a construction for what a messaging server is. So, I'm showing how the two networks talk to each other and that's consistent with the Sprint documents that I looked at. It's consistent with the testimony that I read and what Sprint does infringes the patent because that's the invention of the patent, having a messaging server that communicates externally with the cellular network and where it has these two functionalities.

So, the point of the slide is to kind of bring things together to the jury. We talked about Sprint's cellular network. We talked about Sprint's messaging network and how they talk together and then the next step was to look at infringement.

Q Okay and so, in one of those documents that you referenced that you looked to was PX-125. I believe you read it into the record this morning. Do you have that in your binder? And could we put up, I don't know if you need the document. Can we put up PX-125. Do you recognize PX-125?

A Yes.

Q Okay, can you go to page 13 and blow-up that figure.

THE COURT: What page is that?

MR. GOETTLE: I'm sorry, page 13, your Honor.

Q Dr. Akl, could you have used this figure, in this document, to explain to the jury your opinions and your analysis in this case?

A Yes, this is a much more complicated document. This is a Sprint document. If we can just go back to the first page, I didn't read the title.

Q Oh, no problem.

A I think it's helpful. So, this is a Sprint document and the title of this document is Next Generation Messaging and Imaging Design. So, it's describing Sprint's messaging and if we now go back to the figure that you showed. It is describing different components that I've talked about. And so, you know, you have the phone, you have the base station, tower, you have the base station transceiver, base station controller, you have the mobile switching center. So, these are all components that we've described and then there is a description. This is MOSM-SC side, so this is the mobile originated messaging server with the LDAP. There are, looking at -- this is SMS router. There are, let's see, so there's a lot of components and this is here, a mobile terminated MSMC. So, Sprint has produced many documents and I've looked at a lot of documents and I chose some that I thought are able to convey the best way and get the jury up to speed in the shortest amount of time. Again, it's Comcast's burden to show infringement and as an expert, I have to get the jury up to speed very, very quickly. So, there are many documents. There are many complicated documents that do show the networks interacting and I tried

to choose the best documents that are the most relevant and not make things more complicated for the jury.

Q Okay, do you recall this morning, Sprint -- do you remember during your cross today, Sprint's attorney asking you about routing and some of your deposition testimony that used the word, routing?

A Yes.

Q Can we put up Dr. Akl's testimony from his deposition, page 120. Lines 4 to 5. Could you bring out lines 4 to 5. I'm sorry, I meant 4 to 8. So, in this, do you recall that this is the testimony that got shown to the jury earlier today?

A Yes.

Q Okay and you, in this testimony, did you respond that the SMSC and the MMSC help in routing communications?

A Yes.

Q Okay, in your answer, you referred to Sprint's telecommunications -- well, let's step back. Do you agree with what you said at your deposition that Sprint's SMSCs and MMSCs are involved in routing?

A Yes and just to orient the jury, the deposition -- this is two days of seven hours of questions on the clock. So, this is you go from 9:00 to 6:00 for two days answering questions. So, there's -- it's a very, very rigorous process. It's much more emotionally exhausting then actually

sitting here today. But yes, so there's a lot of questions over two days that Sprint's counsel asks me for all the opinions in my reports. And this is one of those questions during this two-day period.

Q Okay, but do you agree or disagree with what you said at deposition?

A No, I agree. So, if you look at my answer and what I said, you know, I have to be very precise and I always have to think of every work that I say to ensure it's very accurate on the record. I said, yes, the SMSC and the MMSC in Sprint's telecommunication system helped in routing. So, I am not saying it is in Sprint's cellular network. I am generalizing because his question was, "as a general matter." And so, I am answering the question in terms of Sprint's telecommunications system and that's not a term that's defined. This is like when you think of all the services that Sprint offers. They have a cellular network, they have a messaging network, they have a lot of other additional services and you can think of all of it together as Sprint's telecommunications system, as Sprint's telecommunication system. Yes, the SMSC is a component and it does help in routing. So, my answer is correct in the proper context.

Q And when an SMSC or an MMSC in Sprint's network is routing, is that in terms of its function of storing and forwarding?

A Yes.
Q Is the forwarding portion of that what you were thinking of in terms of what routing is?
A Yes, so it gets the message and then it sends it back to the cellular network and that's where the, well, first, you have the query and when you get a response, it says the phone is ready, then the messaging server is going to send the message to the cellular network. So, that's, in a sense, is routing and then the cellular network delivers it.
Q Okay and does the messaging server that's disclosed in the patent, okay, not Sprint's network, but the messaging server disclosed in the patent, does that rout messages in the same way that Sprint's SMSC and MMSCs do, in terms of storing and forwarding?
A Yes. So, in the preferred embodiment, in the messaging server does store and forward, it does have the two functionalities and then the message is delivered using the cellular network.
Q Can we go to Dr. Akl's slides, back in his slide deck and go to Slide 53? Dr. Akl, if the messaging server in the -- what is the preferred placement according to the patent of the messaging server, whether it's a core network element or not?
A The patent says said messaging server would preferably be located outside the cellular network. For example, in the

internet network.
Q But this messaging server that's being talked about on your Slide 53, is that also involved in the routing in the sense that you just explained it?
A Yes, it does the same thing.
Q Okay, do you recall this morning, during your cross, you were asked about the word, core and what the word, core, means and how you came up with that?
A Yes.
Q Okay, did you come up with the meaning of the word, core or did the Court provide it to us? Where did the meaning come from?
A So, the Court didn't provide an exact definition for the word, core and the absence of an exact definition, the instructions are you use the plain and ordinary meaning as understood by one skilled in the art. Those are my instructions.
Q Okay, so is core a technical term?
A No.
Q Okay, so how did you come up with the definition of core?
A How -- basically, it's the plain and ordinary meaning. What does core mean? If you open up a dictionary and look at the word, core, it means essential. So, that's what we go by.
Q And did you actually do that? Did you go to a dictionary

and look up the meaning of the word, core, to get the definition of essential?

A Yes, I think at one point, there were dictionaries that were used and I was provided with those definitions from counsel.

Q And were those regular dictionaries, technical dictionaries, what kind of dictionaries?

A They were just regular dictionaries. They weren't technical dictionaries and just had the word, core. There is a lot that goes behind the scene in terms of where we get to where the Court provides a court construction. So, not to get into any of those details, but we have the Court's construction and we have the definitions and there are arguments that are made that that helped in terms of getting to the definition point. And so, as part of that process, you know, I looked at a lot of definitions from dictionaries.

Q During the cross-examination this morning, did Sprint's lawyers present to you any contrary definition of core, to show that essential is not the meaning of core?

A No, he did not.

Q Okay, do you recall during your cross-examination, that Sprint's counsel showed you a different patent that had the same inventor's name on it? Do you recall that?

A Yes.

Q And do you recall that it said something to the affect of

there's a messaging server located in the cellular network or on the internet?

A Yes.

Q Okay, if a messaging server is located on the internet, is that a geographic location to be on the internet?

A No, again, this is not inconsistent with what I've been saying the whole time is, location isn't geography. Being internal or external isn't where I am physically putting the messaging server. It relates to functionality and is it a core network element, then it's in the cellular network. Or is it not a core network element, then it's outside the cellular network. But the physical location, physically where it's located is irrelevant. So, when it's not in the cellular network, you know, an example is it's part of the internet, it's outside the cellular network.

Q Okay and then finally, this is my last set of questions. Do you recall that counsel from Sprint asking you on cross-examination about my opening, where I referred to the patent being about speed?

A Yes.

Q Do you disagree with my characterization of the patent?

A No.

Q Can we put up Slide 37? Actually, before we look at Slide 37, are patents written to be understood by lay people or are they written to b understood by skilled artisans?

A Skilled artisans.
Q And why is that?
A Because there is technical language in a patent and so, anytime you look at a patent, the first thing that's actually determined is what are the qualifications of a skilled artisan and both parties come up with their definitions and then a definition is adopted and sometimes the Court helps us with that also. So, that's what a skilled artisan and in this case, there is a qualification as to what skilled artisan and it's something, I think, like a Bachelor's Degree with a couple of years experience. There is an exact definition and everything is from the point of view of that person. And so, you're going to see terms in the patent that are -- that need to be understood by that person. And everything is from that person's point of view. And even me, as an expert, I don't use my qualifications, which is usually much more than one of skill in the art. I have to put myself in the shoes of one of skill in the art and think of somebody with those qualification, how do they interpret the claims and how do they interpret the invention and so on.
Q So, Dr. Akl, what is your opinion in terms of what the patent is getting at in terms of speed and how it might help with speed in a cellular network?
A So, it's exactly when I had the white board and I described the problem. The first problem is the message

volume, that's what causes slow down in the network. This is what causes congestion in the network. So, at a high level, it is the issue of making it faster and making it less congested. And that's the first problem and then the solution was move the messages and keep them outside until the phone was ready and then that introduced the second problem, which is the messaging server only knows the phone number. And so the solution to that is how you -- the messaging server is going to send the phone number and then the phone number is going to be mapped and the cellular network is going to return a response.

So, this is consistent with what's in the claims. This is consistent with what's in the specification. But as you -- also, as we were reading the claims, I mean you read it the first time and very, very complicated and then we -- because everything is written from the point of view of one skilled in the art.

Q And did you show the jury where in the patent it is referring to the speed characteristics of the invention?

A Yes, I believe I had a slide on that.

Q Let's put up Slide 37. Is this the slide that you showed the jury yesterday?

A Yes, so this is an example in the patent, where it says, for example, on receiving a message address and given wireless terminal, it is expedient for the messaging server

to make sure, by making an inquiry, that the wireless terminal in question is actually ready to receive. So, that's exactly the problem-solution, problem-solution I was describing and I even pointed out, in my class, that I understood the word, expedient to mean speed. And this is why I don't disagree with your opening.

Q Thank you.

MR. GOETTLE: No further questions, your Honor.

MR. FINKELSON: Your Honor, may I just have a few minutes of re-cross with the witness?

THE COURT: You may.

MR. FINKELSON: I won't belabor the point.

RECROSS-EXAMINATION

BY MR. FINKELSON:

Q Could you put that slide back up on the screen, 31? And you're referring, Dr. Akl, to the sentence that says for example, when receiving a message addressed to a given wireless terminal, it is expedient for the messaging server to make sure and then it continues, is that correct?

A Yes.

Q And you're aware that the Court, in this case, has dealt with that language in the specification, aren't you?

A I'll take your word for it.

Q In fact, the Court has said that what that language means is a suggestion that the feature is mandatory as opposed to

just preferable. Nothing about speed, correct, Dr. Akl?
A I'm not sure I know exactly what you're referring to, but I don't know if you have a document you wand to put in front of me.
Q Let me ask you about the PDSN, again, Dr. Akl and in fact, you know, Dr. Akl, that Sprint didn't have a PDSN in 1999, did it?
A In 1999?
Q In 1999?
A I don't -- the damages period is from 2006 through today. So, as far as my analysis on infringement, it's from 2006 to today. So, I don't think I rendered an opinion on Sprint's network in '99.
Q Well, you've talked a lot about '99 and you know, in fact, that Sprint did not have a PDSN in 1999, correct, sir?
A I'm not sure. In 1999, the reason 1999 is important, that's the invention and the content. That's now where damages begin. That's not where I look at the Sprint network. I look at the Sprint network from 2006 to today.
Q And Sprint's cellular network still worked without the PDSN, right, it didn't crash? You could make a call.
A You could make a call in 1999, yes. I believe Sprint's cellular network started in 1996 and you can make calls.
Q But it's still your testimony that the PDSN is a core network element as used in this Court's definition of

cellular network, correct?

MR. GOETTLE: Your Honor, I'm objecting because the witness has said he doesn't know anything about the PDSN in 1999 and the questions are now inferring that he actually did know and he's answering questions about it.

MR. FINKELSON: Well, I'll ask him about the messaging server.

BY MR. FINKELSON:

Q You know that Sprint did, in fact, have a messaging server in 1999, correct, Dr. Akl?

A They had a receive only capability.

Q And I understand you testified with respect to receive versus originate and I'm not trying to pull you away from that testimony. My question is more specific though. Sprint did have a messaging server in 1999, right, Dr. Akl?

A Maybe no, because they had an MMSC. But if when you're referring to it as a messaging server, we have to look at the Court's construction of a messaging server and it has to have the two functionality of store and forward and inquiry. So, I'm not sure they had the capability to deliver a multi-media or sorry, a text message to a phone that was receive only. So, again, that capability in 1999 of Sprint is really not as relevant, because that's not what we're focusing on.

Q And in fact, I think you said MMSC, I believe you may have misspoke. It was an SMSC that Sprint had in 1999,

correct?
A Yes, it was a mobile terminated SMSC in terms of the horoscopes that I said they can receive horoscopes. It's not until 2004 that they started two-way messaging. So, that's really where we look at the components that would potentially infringe, not 1999.
Q Mr. Baird, would you mind pulling up PX-125, that counsel just showed Dr. Akl. And go the page marked page 13. Dr. Akl, this was the picture that Comcast counsel was just asking you about?
A Yes.
Q And this is an actual Sprint design document, correct?
A Yes.
Q In fact, it's a document called E-1849 Next Gen messaging and imaging, correct?
A Yes.
Q Could you turn to the very next page of this document, Mr. Baird and highlight that diagram, please. You've seen this diagram before, right, Dr. Akl?
A Yes, I think so.
Q I noticed you didn't address it in your testimony before this jury. If you look at the box noted Sprint In Network, do you see that? Could you put highlighting around that, Mr. Baird. It's on the right-hand side, Sprint In Network? This Sprint design document, Dr. Akl, in the box labeled

Sprint In Network, it has a mobile originating SMSC, correct, sir?

A Can I get a paper copy of the document, just because this is a little fuzzy.

Q Sure, your counsel put it on the screen, I believe, in --

A Just I just need this one page.

Q -- it's in your binder, it's Number 125.

A I got it.

Q Take your time, sir.

A And we can remove the yellow. I think it just makes it a little easier. Thank you. Which page are we on?

Q We're on page 14, sir.

A Yes, go ahead, thank you.

Q There's a box in this diagram labeled Sprint In Network, correct?

A Yes.

Q And in that box, there is something called a MSG LDAP, do you see that, sir?

A Yes.

Q Do you have that, sir?

A Yes.

Q That's the messaging LDAP, correct?

A Yes.

Q And it's shown here as being part of Sprint In Network, right?

A Yes, in this box.
Q And also as part of Sprint In Network in this Sprint design document, do you see something called an MO-SMSC, Dr. Akl?
A Yes.
Q And that's the Mobile Originating Short Message Service Center?
A Yes.
Q And that's one of the short message service centers that is at issue in this case, correct, sir?
A Possibly.
Q Yeah and in fact, there's also something called an MT SMSC in the Sprint In Network box, do you that, it's right to the right of it?
A Yes.
Q And that's a Mobile Terminated SMSC, right, Dr. Akl?
A Yes.
Q And that's also one of the SMSCs that is at issue in this case, correct, sir?
A Yes, possibly.
Q Okay and if we could pull back on the document, so you can see the entire diagram. Whereas you have a Sprint In Network box, that we've just been talking about on the right-hand side. There's a separate box on the left-hand side of this Sprint design document, Dr. Akl, that says

Sprint posted off network. Do you see that, sir?
A Yes.
Q If we could highlight just that box? And do you see in the box -- can we blow it out a little bit -- in the box labeled Sprint posted off network, do you see something called an MMSC, Dr. Akl?
A Yes.
Q And that is the synaverse (ph) picture mail, MMSC, correct?
A Yes and my understanding, that's not something that the jury needs to decide upon.
Q Okay and that's in the posted off network box as contrasted with the in network box, correct?
A That's what the headings say, correct.
Q Thank you very much, Dr. Akl.
MR. FINKELSON: I have no further questions.
MR. GOETTLE: Your Honor, can I do a very short redirect?
THE COURT: It's not redirect when you're at it the second time.
MR. GOETTLE: Oh, sorry.
THE COURT: It's sort of re-re, but yes.
MR. GOETTLE: Re-re, it will be very short.
THE COURT: And that, hopefully, will end it.
MR. GOETTLE: When I hear you say hopefully, we'll

end it like that on it. Your Honor, I will not ask any further questions of the witness.

THE COURT: Unless it's really critical that you do, Mr. Goettle.

FURTHER REDIRECT EXAMINATION

BY MR. GOETTLE:

Q Dr. Akl, in trying to decide whether a messaging server, Sprint's messaging server is a core network element or not, how valuable are Sprint documents that have language like in network or CDMA network or core network? How valuable are they to your analysis?

A Zero, honestly.

Q Does this document illustrate that point?

A Yes, so again, we have to go back to the Court's construction. The Court was very helpful and gave us a construction for cellular network. You need to have the phone and we see a phone here. You need to have the base station system, which we see here. I'm sorry, that's going to be all three, the tower and the base station transceiver. And then we need to have core network elements and the MSC is one core network elements. So, this is not -- we're not taking a figure where Sprint engineers is writing down in network or out of network and then just directly saying this is -- matches word for word for the Court's construction. So, it's very difficult here to make a nice box around a

cellular network, because these are in the cellular network. This is a core network element. And this is or not all of it, but some of what you see here, like the messaging service and the PDR, these are in Sprint's messaging network. So, the ability to take these very complicated diagrams that are for their purpose, they're showing introduced elements in red and what the engineer flow chart and they try to map them element for element to the Court's construction is difficult. So, I've looked at hundreds and hundreds of documents to be able to find a document that makes it easy for the jury to understand the issues in this case.

Q And just to be clear, the Sprint network, does that include the things down in the corner that you were circling, the VPS and VSC and the MSC?

A No, so --

Q I'm sorry, down in this corner down here. Let me do it again, I wasn't very clear, is that all right?

A Yes.

Q Yes, these items that just got blown up, are these part of Sprint's network?

A They are -- they are part of Sprint's network. They are part of Sprint's cellular network.

Q So, are these in network?

A Yes.

Q But it depends on what network you're talking about?

A Yes, it depends on the context. Again, so, these that aren't in the box are in Sprint's network and they're in Sprint's cellular network, absolutely.

Q Thank you.

MR. GOETTLE: No further questions, your Honor.

THE COURT: That concludes your testimony, Dr. Akl. You may step down.

THE WITNESS: Thank you. Thank you to the jury for being a great audience.

MR. HANGLEY They're here all week.

(Pause.)

MR. GOETTLE: Your Honor, we call Dr. Dwoskin.

JEFFREY DWOSKIN, Witness, Sworn.

THE DEPUTY CLERK: Please state your full name and spell it for the record.

THE WITNESS: Jeffrey Scott Dwoskin, J-E-F-F-R-E-Y, S-C-O-T-T, D-W-O-S-K-I-N.

DIRECT EXAMINATION

BY MR. GOETTLE:

Q Good morning, Dr. Dwoskin.

A Good morning.

THE COURT: It's afternoon. Good afternoon, Dr. Dwoskin.

MR. GOETTLE: It went so fast.

Q Could you please introduce yourself for the jury?

A Sure, like I said, my name is Jeffrey Dwoskin. I actually grew up in New Jersey, not too far from here. And then went to school at Rutgers for undergraduate work in computer engineering. Stayed in New Jersey and went to Princeton for graduate school, where I got my Ph.D. And then I've since moved up to the Boston area, where I now work as a technical consultant. And I'm actually not sure what else to say, but I'm getting married in about a month.

Q Congratulations.

A Thank you.

Q Dr. Dwoskin, have you ever testified at a trial before?

A No, I haven't.

Q Are you a little nervous?

A A little bit.

Q Dr. Dwoskin, you sat through Dr. Akl's testimony, is that right?

A Yes.

Q Would you say that Dr. Akl's testimony was considerably longer than yours is going to be today?

A Yes, I think I'm going to be a lot quicker.

Q Okay. So, can we put -- did you and I work together to prepare a slide presentation to explain your analysis and conclusions to the jury?

A Yes.

Q Does this look like the cover page, the first slide of

your presentation?
A Yes, it does.
Q Did you prepare a slide that would tell the jury what you were asked to do by Comcast counsel?
A Yes, I did.
Q So, I'm looking at your Slide 2, what were you asked to do?
A So, I was asked to provide some information that Dr. Akl relied on. He was talking about SPS and MLDAP, so I was looking at the operation of SPS and the operation of MLDAP. In particular whether from 2006 until today, two things. Whether SPS and MLDAP mapped MDNs, those are phone numbers to in the inquiries, to specific second identifiers. And whether those specific identifiers identify a specific phone and how information is determined using those second identifiers.
Q Okay, so before we get to your conclusions and your analysis, let's walk through your technical background.
A Okay.
Q Can you please give the jury high level summary of your education?
A Sure, so I kind of introduced it before, but I went to Rutgers for my undergraduate work, focusing computer engineering. It's technically the electrical and computer engineering department, but I was working in computer

engineering. And then I went to Princeton University where I was working toward my Ph.D., which I received in 2010. I got a Masters along the way as part of the process. And I wrote a dissertation, the title is on here, but basically, it has to do with databases and networking protocols, that's how computers talk to each other over networks. As well as computer security and computer architecture, so how you design computers to make them more secure.

Q Okay and can you please tell the jury about your professional experience?

A Sure, so right now, I work at Straus Freidberg as a consultant doing technical consulting. It was formerly Elysium Digital. Just a different name, but the same company, they got acquired. And as I said before that, I was at Princeton and as part of my graduate work, I was also an employee as a research assistant. While I was at Princeton and at Rutgers, I also had a number of internships in other jobs, so the U.S. Department of Defense is one of those. And I've also, in the past, started my own small company, an internet service provider. That's the last one there Faradic (ph) Internet Services.

Q Okay and do you have any achievements?

A Yes.

Q Any at all?

A I prepared a slide highlighting --

Q I realize that's a terrible question.
A I prepared a slide naming a few of them. Specifically, I was an inventor -- am an inventor on a U.S. Patent myself. I've also published a number of papers and conferences and I've presented my work at technical conferences. And then I also, as it's relevant here, I have extensive experience designing and implementing databases and LDAP clients and other servers.
Q Can you go into a little bit more detail about that, what is your experiences with designing databases and in particular, on LDAP?
A Sure. So, throughout my work, I often encounter databases either as a user of them or creating them. So, there have been times where I've needed to design an application. Let's say I'm creating a website and I need to store data networks that I'll build a database. I'll design it. I'll decide what data goes in it and how it's organized and set that up. Also, when I've had customers or clients in consulting, where the technical work has to do with databases, I'll experiment on those databases, I'll look at how they work. Things like that and it comes up frequently that I need to do that. And the same with servers, you know, running my own ISP, I was frequently setting up servers, testing them, setting them up to use for our clients, a number of things and experimenting with how they word and

they interact with each other.

For LDAP specifically, some of my work and particularly, there was a project I worked on where I needed to query an LDAP server, very much like we're going to talk about today. And this was in the context of a university system. So, I was at Princeton and designing a website that needed to find out about students. So, I designed it to make queries to the University's LDAP server, to get information about people, what they do, are they a graduate student, do they live in this particular dorm, things like that.

Q Okay, thank you.

MR. GOETTLE: Your Honor, I offer Dr. Dwoskin as an expert in computer science and in particular, with databases and LDAP.

THE COURT: Any objection?

MR. FINKELSON: No objection, your Honor.

THE COURT: Then the Court accepts Dr. Dwoskin as an expert in computer science and databases including LDAP. As with Dr. Akl, this is an expert witness. He's presented to you with qualifications. There's no objection to the qualifications. You should treat his testimony as testimony like any other witness. I'll give you further instructions on how you address the credibility and believability of all expert witnesses. One of the things, for example, if the expert witness bases an opinion on facts and you find those

facts not to be established, not to be credible or believable, then you can disregard the expert's opinion on the facts. On the other side of that coin, if you find the facts on which an expert bases an opinion, to be believable, credible, then you accept the opinion on that issue. More on this later. You may proceed.

MR. GOETTLE: Thank you, your Honor.

BY MR. GOETTLE:

Q Dr. Dwoskin, do you have any stake in the outcome of this case?

A No, I don't.

Q Do you have any financial interest in the outcome of this case?

A No.

Q Okay, were you retained and as Dr. Akl testified, were you retained and just for your time to help in the case and are being paid just for you time?

A That's right, my time is billed, but I don't have any stake in the outcome.

Q Okay, so let's talk about your investigation that you performed in doing your analysis and coming to your conclusions. What did you and now we have up your Slide 6.

A Yes, so this is a slide I prepared that outlined some of the things that I looked at. In large part, I reviewed extensive documents. Documents that were provided by Sprint,

as well as documents provided by others. So, Nokia Sieman's networks is the company that makes the SPS and we're going to talk a bit about the SPS. So, I reviewed documents from them, as well as documents from Open Wave Systems, they're the company that makes the MLDAP, the messaging LDAP that you've already heard about.

In addition, I looked at some publicly-available information about the relevant databases. I've also reviewed deposition testimony from Sprint employees, as well as Open Wave employee. And then furthermore, there were some issues that I wanted to verify myself about how particular databases worked. So, I actually configured and set up my own replica of a part of the MLDAP, that same software that's used by Sprint, to see precisely how it worked and how it stored data.

Q Okay, so are you first going to talk about what LDAP is?

A Yes, I know we're heard a lot about LDAP and I think it will be helpful to give a little bit of background, so the jury members can understand some of the technical details that we're going to go through.

Q Okay, so why don't you describe what you're showing on your Slide 8?

A Sure, so we talked a lot about LDAP so far, Dr. Akl and others. But we haven't really talked about what is it, what is stored in one of these LDAP databases or directories. And

so what I've done here is I've prepared a somewhat less technical example of what might be stored in a LDAP directory and how that works.

So, in this example, you can see that it sort of looks like an upside down tree and I've sort of taken a subset of that. But what we're doing is we're saying, what if, for example, I want to store information about football players in an LDAP directory. An LDAP directory is used to store -- usually to store information that you can look up later. So, I want to create it as a hierarchy and that's what you do with LDAP and organized the information.

So, here, the example is you start off with the root at the top. I'm not as good as Dr. Akl at drawing the circles here. We start off with the root at the top and that's -- that holds everything, right, so everything comes underneath the root. And then next we have the highest level category. So, everything here we're going to talk about has to do with the NFL. So, we say the league that we're putting in this LDAP directory is NFL. And then I put more specific information in the hierarch and I organize the information.

So, I say, we're going to look at the NFC and then within that, we're going to look at NFC East and then within the NFC East is the team, the Eagles. And then within in the Eagles, I'm going to have particular players. So, here I show Carson Wentz and of course, this real tree would be a

lot bigger, you'd have every single player, you'd have every single team, so you know, we can't really fit that on the slide, so I didn't put all of that in here. But that's basically how information is organized in a LDAP directory.

Q So, could you, Dr. Akl -- sorry, Dr. Dwoskin, could you given an analogy that might be helpful in understanding how this tree is set up?

A Sure, so one of the ways I like to think about in the even less technical sense, is imagine you have a room full of filing cabinets right here for storage. You want to store documents, like physical papers about your teams and your players, how you might do that. So, what I could do is say that the individual players' information might be in a folder of papers, right? It has all their player statistics and photos and other information. So, you put all of that in a folder. You take that folder and you're going to put it in a drawer in your filing cabinet. So, you might say, a player called Carson Wentz is one folder inside the drawer for the Eagles where you store all of the information about the Eagles.

And then that drawer is part of a larger filing cabinet that has multiple drawers and maybe you have a filing cabinet for the division equals east and then you have a row of filing cabinets for the NFC and another row of filing cabinets for the AFC. And all of this in your file room for

the NFL.

So, you can look at the LDAP directory the same way. You say league equals NFL, so if league equals NFL, that's the room that we're in. Conference equals NFC, that's the row of filing cabinets. Division equals East is a particular filing cabinet. Team equals Eagles is a drawer in that filing cabinet that I can look in and then player equals Carson Wentz is a folder that I can look for in that drawer.

Q Thank you.

A You're welcome.

Q Okay, you're now going to explain distinguished name.

A Yes, so we got through this sort of complicated hierarchy. And what happens is you need to describe the specific things that you find there. So, distinguished name is really just that, it's a name. It's a unique name for anything that you might find.

So, how do I describe a particular item in the directory? I'm going to name it by that hierarchy. So, what I do, is I start on the bottom, if you can click, there we go. So, what I'm showing here is the distinguished name -- there we go -- the distinguished name for this object, player equals Carson Wentz. So, you start off with just the lowest level, the most specific piece comes first. So, that's player equals Carson Wentz, where I'm showing the green line.

Then you go the more general. You go from specific

to general. So, player equals Carson Wentz, then team equals Eagles, then division equals East, then conference equals NFC, then league equals NFL. And in that way, the overall DN here gives you the very specific, exact location in the directory of that object.

Q Okay, now are you going to talk about -- explain what an LDAP query is? First of all, what does query mean?

A So, in this case, as Dr. Akl spoke about, query is when you want to ask a question to this database. You want to say can I have some information that's stored there. So, in this case, I'm using the example, you want to ask what are some of the player statistics for Carson Wentz? But of course, we'll see in Sprint's case, they are more relevant to phones, whereas here, we're using the example.

So, if you wanted to look player statistics for a particular player, you have to ask the server specifically what you want to find. And the way that works is you first have to tell it where to look and then you have to tell it what to look for. So, there are two pieces to the request. The first one is where to look, that's the base DN, there we go. And then, what to look for is the filter. So, the way this works is you say where to look and what I'm going to do in this example, is say I want to look in the team equals Eagles section of the tree, right. I know that what I'm looking for is a player on the Eagles so I'm going to tell

it, start there. You don't have to go to your file room and look through every folder of every drawer, I know which drawer I want you to go to, to start off. And so, I say, I put that full name, that base DN here for team equals Eagles, division equals East, conference NFC, league equals NFL. So, go to the room, go to that particular row, go to that filing cabinet, go to that drawer and then start looking.

And then the filter says what information should you look for once you get to that spot? So, I say, open that drawer, flip through the folders and find one that has the name player equals Carson Wentz.

Q Okay and then there's a response from that query?

A Yes. So, the server goes and looks that up, it goes and finds the information and then it sends -- it looks and finds what information is there. So, it's going to go to that folder, pull up the papers with information and find the answers that you're looking for. So, in this case, I said what are the player statistics. It will say okay, I have a bunch of player statistics. I'm going to sent those back in the response to whoever was making the query. So, if a particular server asks or a client asks this LDAP server for that information, I send the response back to the person that was asking. And that's what I show here. It's just an example of what a response might be.

Q We're now going to talk about the SPS?

A Yes.
Q What are you showing on your Slide 18?
A So, here I'm showing some of the information that's stored in the SPS about a particular phone. So, all of these are attributes, as they're called in the technical term, that describes some information. So, this is just like those player statistics. Each one is a piece of information that's stored and associated with a particular phone. So, for example, we have the phone number here, the MDN, that's stored in the SPS. We also have some attributes that have to do with whether that phone is allowed to send and receive SMS messages. It's unfortunately all lower case, so it's a little hard to read. But SMS allow MO messaging for Message Originated or MT for -- sorry, mobile -- originated and mobile terminated messaging. As well as a number of other attributes about the phone.
Q Dr. Akl, what --
A Dwoskin.
Q -- I'm sorry, Dr. Dwoskin, I apologize for that. What elements in Sprint's network are calling or querying for these attributes?
A So, there are a number of different clients that make queries, that are asking for this information. We've talked about some of them. The SMSCs and MMSCs, as Dr. Akl said, make queries to the SPS to retrieve some of this information.

But there are a number of other components, as well, to make queries to the SPS.

Q Do you know what any of them are?

A Yes, there are a number of them. I have a full list in my report. But we have thinks like the vision AAA servers and the send servers. I already said the SMSCs and the MMSCs, the PDR, as well as some other clients.

Q So, you're actually reminding me that I forgot -- did we give you the binders?

A No, I don't have it.

MR. GOETTLE: Your Honor, can I go grab some documents?

THE COURT: You may.

(Pause.)

MR. GOETTLE: May I approach, your Honor?

THE COURT: You may.

(Pause.)

BY MR. GOETTLE:

Q Dr. Dwoskin, in the thin binder, I think you'll see a PX-112 --

A Yes.

Q -- in there?

Q Would PX-112 help you recall what other elements or computers or systems in Sprint's network rely on the SPS for data?

A Yes.
Q Okay.
MR. GOETTLE: Maybe turn to -- can we put PX-112 up?
I should say, your Honor, this document is in the omnibus motion, it's not objected to.
THE COURT: So it's received.
(Plaintiff's Exhibit PX-112 received in evidence.)
MR. GOETTLE: Thank you.
BY MR. GOETTLE:
Q How about page -- I think page 3.
A Yes.
Q Just does this help you recall what components -- I don't know, do you have a word? I keep struggling with the word, that call to the --
A Clients usually, but --
Q Clients?
A -- but they're also components.
Q Okay. So like the SMSC, Sprint's messaging server, calls to the SPS?
A Yes.
Q You would refer to that as a client?
A Yes --
Q Okay.
A -- a client of the SPS.
Q Okay. So what other clients call to the SPS?

A So if we look down here in Section 3 of the table of contents it lists different applications which are different components or functions that make calls to the SPS. So here we have Vision AAA, Q-Chat AAA, 4G AAA, those are all components in Sprint's systems that query the SPS. We also see for example BMP NSN -- NSN HSS, Ericson HSS, a number of others, IOS, Gateway, all of these here in the list would make queries to the SPS.

Q And I see that 3.6 says messaging?

A Yes.

Q Would that be the Sprint messaging servers?

A That would include a number of Sprint messaging servers MMSCs and SMSCs, as well as others.

Q Okay, thank you.

MR. GOETTLE: Can we go back to the slide?

(Pause.)

BY MR. GOETTLE:

Q Okay, so now we're on your Slide 19 out of 31; what is Slide 19 showing?

A So this is showing a Sprint document of how the SPS operated. This is one particular example of how a query would be made to the SPS and how the SPS operates internally to determine the response to that query and then send the response. And there's a lot of information here and I'm going to walk through it step by step, so everyone on the

jury can understand what's being shown here.

Q Did you create what we're looking at on Slide 19 or is this a Sprint document?

A No, this is a Sprint document. I put the title at the top of the slide, but the rest -- and I guess the PX- number on the bottom, but the rest is directly from a Sprint document.

Q It's PX-113?

A PX-113, yes.

Q Okay. So what is the inquiry?

A Right, so what I'm showing first on the left is the inquiry. So this -- for example when Dr. Akl spoke about an MO DIP or an MT DIP to the SPS, there's a server, a client that's making a query to the SPS to get some information about a particular phone, that's what we're looking at here, the query that's coming into the SPS. And I've blown up this a little bit more so you can read it.

And it's just like the example I gave before with the player statistics query that you need to have two pieces of information to make a query, where to look and what to look for. So the top part here is where to look, that's the base DN, and in this diagram Sprint has drawn it with pictures to make it a little easier. So it's showing you the hierarchy. So first you have sprintOU=sprintpcs.com, that's at the top of the tree, then as you get more specific,

O=sprintpcs and OU=consumer. So it's saying go to sprintpcs.com, go to sprintpcs, go to consumer, and look there for the information I'm going to ask you for.

And then the filter is saying, that's down here highlighted in yellow, what to look for. So look for an object, some information that matches MDN equals a particular phone number.

Q So do each of the queries also contain the MDN, which is the phone number?

A So all of the queries that I'm going to talk about that are made for the MO DIP and the MT DIP that Dr. Akl described, all of those queries are made with the MDN and the filter when querying the SPS.

Q Are you now going to explain how the mapping is performed in the SPS?

A Yes, that's right. So Dr. Akl went over the different steps that are required and where he relied on me and my testimony, and so I'm going to go through each of those, and the query was first and next comes the mapping.

Q So I just put up Slide 21. What is this showing?

A So this is showing the next steps in how the SPS performs the query and what it has to do is map the information that came in in the query, that base DN and the filter, to other information that's actually used to make the query. The SPS stores a lot of data and it's not actually organized in the

same way that the query was made. So the query had those components in the base DN that said where to look, but that's not really where the data is.

So internally the SPS does what's called adaptive naming and that's shown with this arrow. It takes what was in the query, it's a little bit grayed out here, and maps it into what's shown here. And there's actually multiple mapping steps -- I'll clear that -- there's actually multiple mapping steps going on in the SPS and I'm going to focus on the bigger picture of sort of where we start and where we end up.

Q Are you going to explain adaptive naming in a little more detail?

A Yes. I have another slide.

Q Okay, why don't we talk about that. So your Slide 22?

A Yes. So this is an excerpt from one of the Sprint documents that describes how adaptive naming takes place, so this is PX-118, and it's basically saying the same thing that I just said, that -- reading the second big box there, adaptive naming configuration provides a set of mappings to match the DNN filter from the application request. That's the query, that's the base DN and the filter that the client made, and map it to a real DNN filter, that's the real location where it's stored in the SPS. So where to look and what to look for once you're there inside the SPS.

Q Okay. Back to more mapping?
A Yes. So this is the result --
Q I'm sorry, you're on Slide 20 -- we're on 23 now?
A Yes.
Q Okay.
A Slide 23 is showing the result of that mapping. So what we have here is the result is the second identifier of the final DN for the device. So this is showing -- what we've mapped to is shown here in yellow and I've blown it up a little bigger. This is basically a different base DN that's going to be used internally in the SPS that was -- that the SPS mapped from the phone number to this final DN through that process of adaptive naming and a few other steps that go on internally.

And so this is again showing the name, the distinguished name, that's DN, of this big part here that's showing the particular object that you're looking for inside the storage of the SPS.

Q So does the DN that you're showing there where it says "Final DN for device," is it all of that information that's below is part of the DN or is it just the first line?
A It's the entire thing. So this whole thing here is the DN, the distinguished name, because as I said before, you give every object, you know, every piece of information you want to talk about has a long name that describes exactly

where to find it. So this is saying, you know, go -- starting from the bottom, you start -- which is the top here, you start at sprintpcs.com, you go down O=sprintpcs, and you work your way through that to find the specific data that's stored in the SPS.

Q So does the SPS use that final DN as an identifier of a specific phone?

A Yes, it does.

Q And how do you know that?

A Well, there are a number of ways. One, you know, I've read a lot of documents and heard deposition testimony that confirm that that's how it works, but I've also looked at what's stored there. This object, if you see here there's -- now that's a variant view and what that basically means is that when you requested this object the SPS internally goes and finds the information, and I've looked at the results of that information to see that there are attributes there for a particular phone.

And then there's some other information as well. One of the components here is the GUID, which is a subscriber ID that corresponds uniquely to a particular phone for that subscriber.

Q So does each phone correspond to a component GUID?

A Yes, it does.

Q Okay. So does the DN contain specific information for

the phone because it has the MDN and because it has the GUID?
A Yes, those are some of the reasons, but I've looked into, you know, more information about what attributes are there to confirm that in fact there is unique information about the phone stored there.
Q Is there anything --
A And I think I have --
Q Oh, please, go ahead.
A I was going to say I think I have on the next slide a little more information about the GUID.
Q Oh, okay. Is that what you mean or the next slide?
A The next slide. I think I already drew this -- oh, okay, maybe it comes up a little later or maybe not anymore, but --
Q Was there anything else you want to say on the mapping step before we move to determining?
A No, I already explained it. I thought we at one point had a slide, but --
Q Okay. So now we're on the determining step?
A Yes. So what I'm showing here is once the SPS has mapped the MDN, the phone number, to that long final DN, it uses that final DN to retrieve information about the phone. So it goes to that variant BU object and it retrieves that information, it uses that final DN to go through how the data is actually stored to pull up the information. And what I'm showing on the right here blown up is some of the attributes

that are stored in the SPS that are then retrieved using that final DN.

And again I've highlighted those same two attributes. The SMS allow MO and MT messaging that are among other information that's stored and retrieved using the final DN.

Q And what happens next?

A So next the SPS takes that information and it uses it to create a response to send back. So, you know, just like we talked about in the example at the beginning, you ask for player statistics, I'm going to send you back information with those player statistics, the SPS is doing the same thing. We asked it for information about this phone using the phone number, we've internally mapped it, mapped that phone number to a final DN and retrieved information, now I'm going to send that information back. And so what I'm showing here is the actual response message that would go back to the client for those MO-DIPs and MT-DIPs to the SPS and showing how that's sent back.

And what we can see at the bottom here is a lot of the different attributes that are sent back and that those are sent back along with the MDN itself, in this case in two places. It shows the DN saying which object, what information am I sending you back includes the MDN, as well as the attributes among the information is the MDN again.

Q Okay, so just to step back at a higher level. Has the SPS operated in this way, the way you just described it, with respect to messaging in Sprint's network since Sprint began using it?

A Yes, it has.

Q Okay.

(Pause.)

Q Okay. Should we move on and talk about the messaging LDAP?

A That would be great.

Q Okay. What are you showing on your Slide 27?

A So this is a document prepared by Sprint, PX-186, showing for the MLDAP when it was used and what versions of the MLDAP were used when.

Q Well, when it says version 5.5.1.2 that you have blown up there, what does that mean?

A So what that's talking about is the Openwave software, so Openwave is a company that made a piece of software and this is the particular version of that software that Sprint was using at that time. So in 2003 Sprint started using version 5.5.1.2, long-winded version number, of the Openwave software for their LDAP, and then in 2008 they upgraded to a newer version, version 6.2.1.

Q So for the entire period relevant for this case when the messaging LDAP was being used was it using only one of these

two versions?
A It was using one at a time, but it was using both of these versions throughout the time that I'm looking at.
Q Way better way of wording it. And -- actually, I'll come back to it.
So what were the -- what's the type of information that's stored in the messaging LDAP?
A So it's very similar information to what was stored in the SPS. So this is information about a particular phone again and we see some of the same attributes, actually a lot of the same attributes that were stored in the SPS. So we have the MDN, the phone number, we have those SMS, allow MO and MT messaging, as well as a number of other specific information about a phone.
Q I forgot to ask you, what did you do in terms of your investigation to figure out how the messaging LDAP worked in Sprint's network?
A So as I said before, I did a number of things. I first looked at extensive documents from Sprint and from Openwave, I also reviewed deposition testimony from Sprint witnesses and an employee from Openwave who was able to explain how their software was used by Sprint. And then I got a copy of the software from Openwave and I installed a copy of it, and I configured it in a similar way to Sprint to understand how it stored information.

Q How did you know how to configure it? How did you know how Sprint had configured it in the past in order for you to try to replicate that?

A So some of the documents that were produced included configuration information explaining how Sprint's MLDAP was configured and we also confirmed in deposition testimony that that is how it worked for the specific parts that mattered to my investigation.

Q So what's involved in trying to create the computer that you created to kind of mirror the messaging LDAP?

A Well, so there are a number of steps. I had to get a computer that it would run on, install the software, configure the software in a similar way and load the data, look at -- you know, extract -- run some sample queries and extract the information that was stored there to see how it was stored.

Q Okay. What -- similar to the question I asked you about the SPS, what clients, I think you referred to them, but what Sprint components or computers call to the messaging LDAP for data?

A So similarly to before, there were SMSCs and MMSCs that queried the MLDAP, as well as other components such as Webmail, Shortmail, Soapservers, there are a number of them that make queries to the MLDAP

Q Okay. Are you now going to talk about how the MLDAP

operated?

A Yes, I am.

Q Okay. What are you showing on your Slide 29?

A So here I'm showing the first two steps. This is -- it works very similarly in the way we're looking at the steps from SPS. So first there's an inquiry, so that's what's shown here on the left. And this is a diagram that I prepared, this one is not a Sprint document, but that I prepared based on what I've learned from Sprint documents and Openwave and the deposition testimony, as well as my own experiments.

So first there's the inquiry, that's a client making a query to the MLDAP, again for the MO-DIP and the MT-DIP that Dr. Akl described, and that query comes in containing the MDN. So the client is saying please provide information about this phone number and that's the first identifier.

And then once the MLDAP receives that query, it maps the phone number to what's called an entry ID. So here I'm showing the MLDAP database and I'm showing information that's stored there and one of those things is called an MDN index. And so if the MDN has sent in the query as part of the filter, the MLDAP will look at this table, and that's what I'm showing here is a table that maps the phone number to an entry ID. And it looks up -- it takes the phone number that came in, and that's this blue arrow here, and tries to find

that MDN in the table; once it finds it, it finds the corresponding entry ID and that's the second identifier.

Q So does the -- you have the entry ID labeled as the second identifier?

A Yes, that's right.

Q Does the entry ID -- does the messaging LDAP use the entry ID to identify a specific phone?

A Yes, it does. There's information, as we're going to see, that's stored in the MLDAP using that entry ID and that information is specific to the phone.

Q Okay, you're going to now talk about the -- I just clicked and something else came up?

A Yes. I had prepared it to highlight that these entry IDs are used to identify a specific phone.

Q Okay. You know what, I should have asked you just so there's no misunderstanding. Is this what your messaging LDAP operation slide, is this a Sprint document that we're looking at here or is this something you created?

A This is something I created. I wanted a document similar to the one we looked at for the SPS that would show step-by-step what's happening.

Q Okay. Now you're going to talk about how the -- how that determines the information that's requested?

A Yes.

Q Okay.

A So as we saw in the mapping step, the phone number is mapped to this entry ID, that's this section, the table on the right is how the information is actually stored in the database inside MLDAP. And so what happens is the entry ID is -- that's contained from the mapping is used to look up -- in this second table to look up the information about the phone. So here I'm taking -- and I think we have a typo that that would be the same entry ID, in practice the -- that entry ID that we've used in the mapping step would correspond to the same entry ID in the entry table where it would be used to look up the information about the phone.

Q I'm sorry, I'm looking -- what is the typo -- you said there's a typographical error, just so there's no confusion I want to flag it.

A Yeah. So in the first column we have the entry ID 115831212, we're missing the 5 in the second column.

Q I see.

A But what I'm trying to show here is that that would be the same number and I believe the other ones in the table are correct. So for example if we had looked up the second MDN in the query, we would map it to the second entry ID, which would correspond to this second row in the entry table and give you information about the second phone.

Q Now, what happens next?

A So just like in the SPS, once we've determined

information from the database using that second identifier, we -- we as in the MLDAP puts that information into a response message to send back to the client that was requesting it. So in this case I'm showing an example response message for that same MDN that was part of the query, including various attributes, including again SMS allow MO and MT messaging as examples of information that would be sent back.

Q So, Dr. Dwoskin, is how you just describe the MLDAP operation, is that how the messaging LDAP worked in Sprint's network from February of 2006 up until the end of the time that Sprint used the messaging LDAP, is that how it worked when Sprint subscribers were sending and receive SMS or MMS messages?

A Yes, that's right.

Q Okay. So turning to your binder, maybe we'll do the thin one first, what is in this binder?

A So there are a number of documents here that were produced. These ones are documents about how the SPS operated.

Q Did you review these -- have you seen these documents before?

A Yes, I have.

Q Did you review them and rely on them in forming your opinions?

A Yes, I did.
Q Are these all the documents that you reviewed?
A No, they're not. There were quite a number of documents that I reviewed.
Q You've picked the thinner ones in this binder.
A Yes, these ones were shorter documents.
Q Could you for the record read into evidence the -- read into the record, sorry, read into the record the exhibits that are in this binder?
A Yes. It's PX-46, PX-49, PX-112, PX-113, PX-114, PX-115, and PX-118.
MR. GOETTLE: Your Honor, to the extent they're not already in evidence, I offer the exhibits that Dr. Dwoskin just read into the record.
THE COURT: Is there any objection, Mr. Finkelson?
MR. FINKELSON: There's no objection, your Honor.
THE COURT: Those exhibits, 46, 49, 112, 113, 114, 115, and 118 are received.
(Plaintiffs' Exhibits PX-46, PX-49, PX-112, PX-113, PX-114, PX-115, and PX-118 received in evidence.)
MR. GOETTLE: Thank you, your Honor.
BY MR. GOETTLE:
Q Dr. Dwoskin, can you pull up the bigger binder?
A Yes.
THE COURT: Are these binders identified in any way?

Are they --

MR. GOETTLE: Only by the exhibits that are in them. I know there was some --

THE COURT: All right.

MR. GOETTLE: Okay.

BY MR. GOETTLE:

Q Dr. Dwoskin, can you look at the documents -- you've seen the documents in this binder before, this isn't the first time you've seen this binder?

A Yes, that's correct.

Q And are these documents that you relied on in performing your analysis and forming your conclusions?

A Yes, they are.

Q Could you read the PX- numbers?

A So PX-44, PX-86, PX-117, PX-125, PX-127, PX-186, PX-254, PX-259, PX-260, PX-261, PX-263, and PX-325.

MR. GOETTLE: Your Honor, to the extent those exhibits that Dr. Dwoskin just read are not already in evidence, I would move the admission of the exhibits.

THE COURT: All such documents are received in evidence.

(Plaintiffs' Exhibits PX-44, PX-86, PX-117, PX-125, PX-127, PX-186, PX-254, PX259, PX-260, PX-261, PX-263, and PX-325 received in evidence.)

MR. GOETTLE: I have no further questions. Thank

you.

THE WITNESS: Thank you.

MR. FINKELSON: Your Honor, may I suggest a short break perhaps before we start the cross?

THE COURT: That's appropriate. It's ten after 3:00, we'll recess for ten minutes.

(Jury out at 3:09 o'clock p.m.)

THE COURT: Be seated, everyone. You may step down, Dr. Dwoskin.

Any decision on Juror No. 5? Should we go to sidebar?

(Sidebar discussion held as follows:)

MR. HANGLEY: Comcast would like to let him go, but I think we require unanimity on that.

MR. FINKELSON: We're inclined to have him stay.

THE COURT: Then he stays. The jury asked for clarification on instructions regarding not discussing the case. They want to know if they're able to discuss general issues such as how the case is moving along and Counsel.

MR. HANGLEY: And Counsel.

MR. FINKELSON: At least they didn't say and the Judge.

(Laughter.)

THE COURT: And the Judge. I'm afraid it opens --

MR. FINKELSON: It sounds like (indiscernible) --

MR. HANGLEY: It opens the door, it really opens the door.

THE COURT: I mean, they're liable to say one is good, one is bad and the other one -- I'm going to tell them --

MR. HANGLEY: You know, I served on a jury two years ago --

UNIDENTIFIED SPEAKER: Oh, my God.

MR. HANGLEY: -- this non-discussion plays --

THE COURT: Yes, it's a very difficult concept to convey.

MR. HANGLEY: No, it's a nonexistent phenomenon is what it is.

THE COURT: That may very well be true.

MR. FINKELSON: Judge, can I raise one other issue? When you were instructing them on accepting or not accepting an expert's opinion --

THE COURT: Yes.

MR. FINKELSON: -- you said that if you accept the facts then you accept the opinion.

THE COURT: Then you can accept the opinion.

MR. HANGLEY: Yeah, but that is not what you said.

MR. RIOPELLE: Yeah, you said if you accept the facts then you accept the opinion.

THE COURT: Get the -- carve out the instruction on

experts -- do we have one?

MR. RIOPELLE: We do, we have a draft one.

MR. FINKELSON: We have a draft one in --

THE COURT: No, do we have one in our charge? We should.

THE LAW CLERK: I believe we do, yes --

MR. FINKELSON: Yes.

THE LAW CLERK: -- but there's not one in the preliminary instructions.

MR. FINKELSON: We do have one in the charge.

THE COURT: I know that -- well, no, we'll use the one from the charge.

THE LAW CLERK: Okay.

THE COURT: Just make a copy of it.

MR. FINKELSON: Thank you, your Honor.

(Sidebar discussion concluded.)

(Court in recess; 3:12 to 3:25 o'clock p.m.)

THE COURT: Be seated, everyone.

Ladies and gentlemen, because we've heard a good deal of expert testimony, much of yesterday and all of today, let me read what I will charge you on expert testimony, my instructions with regard to expert testimony. I'll do it again at the end of the case, but let me explain because I might have misspoken earlier.

When knowledge of technical subject matter may be

helpful to the jury, a person who has special training or experience in that technical field is called an expert witness and is permitted to state his or her opinion on those technical matters. However, you are not required to accept that opinion. As with any other witness, it is up to you to decide whether to rely upon it.

In weighing the expert testimony, you may consider the expert's qualifications, the reasons for his opinions, and the reliability of the information supporting the expert's opinions, as well as the factors for weighing testimony of other witnesses.

I'm not going to get into all of that at this time, but in weighing the testimony of other witnesses, as an example you can consider whether or not the witness' testimony is corroborated or backed up by other testimony, or whether it's contradicted by other testimony. And there are other issues, I don't want to get into all of the ways in which you weigh credibility now, we'll do that at the end of the case.

Now, let me continue. Expert testimony should receive whatever weight and credit you think appropriate given all the other evidence in the case. You are free to accept or reject the testimony of experts just as with any other witness.

That is my instruction on expert testimony.

I think that addresses the issue we discussed.

MR. RIOPELLE: Yes, your Honor.

MR. FINKELSON: Yes, your Honor.

MR. GOETTLE: Thank you, your Honor.

THE COURT: Fine. And now we'll continue with the examination of this witness.

MR. FINKELSON: Thank you, your Honor.

THE COURT: We'll start the cross.

CROSS-EXAMINATION

BY MR. FINKELSON:

Q Good afternoon, Dr. Dwoskin.

A Good afternoon.

Q Dr. Dwoskin, your analysis in this case focused on the years from 2006 to the present, correct?

A That's right.

Q And that's because you understand that the years from 2006 to the present are what matter in this case when it comes to the issue of whether Sprint does what the '870 Patent claims say, correct?

A That's right.

Q In fact you know that one of the databases that you've talked to the jury about today, Sprint's SPS, it didn't even exist prior to 2006, right?

A Not in Sprint's setup.

Q In other words, Sprint didn't have an SPS prior to 2006,

correct?
A As far as I know.
MR. FINKELSON: Can we have from Dr. Dwoskin's slide deck Slide PD3.27, please, Mr. Baird?
BY MR. FINKELSON:
Q Dr. Dwoskin, you were asked about this in your direct examination; this is one of the slides that you prepared, correct?
A Yes.
Q And where it says "2003-version 5.5.1.2," parentheses, "(two-way messaging)," do you see that?
A Yes.
Q And that refers to the version of Openwave messaging LDAP that Sprint used in 2003 when it started doing two-way SMS messaging, right?
A I don't know if that's when they started using two-way messaging, but that's when Sprint started using this version of the Openwave MLDAP.
Q For SMS messaging, correct?
A Yes, for at least SMS messaging.
Q And at least according to the document on your slide for two-way messaging, correct?
A Yes.
Q You talked to Counsel about the concept of mapping in your testimony a few moments ago; do you recall that, sir?

A Yes.

MR. FINKELSON: Can we just look, Mr. Baird, at PX-2, which is the patent, and Claim 1, please?

BY MR. FINKELSON:

Q Dr. Dwoskin, do you see in front of you Claim 1 of the '870 Patent?

A Yes.

Q And the word mapping is in Claim 1 of the '870 Patent, correct?

A Yes.

Q And then it's also included in Claims 7 and 113 by those claims reference to other claims in the patent, correct?

A That's my recollection.

Q And as you have applied it in your analysis in this case the word mapping in Claims 1, 7 and 113 of the '870 Patent simply means determining a correspondence between one thing and another thing, isn't that correct?

A That's how I've used the term mapping, I haven't offered an opinion on how it's used in the patent.

Q That's how you've interpreted the term mapping in providing all of the opinions that you're providing in this case, correct?

A Yes.

Q Including any opinions you're providing as relate to the '870 Patent that brings us all here together on this Friday

afternoon, correct?
A That's right. I just haven't offered any specific opinions about the patent itself.
Q And in fact, Dr. Dwoskin, you are not offering any opinion in this case on whether Sprint's messaging servers are inside or outside of Sprint's cellular network, are you?
A That's correct.
Q No opinions on whether Sprint's messaging servers are internal to its cellular network or external to its cellular network, correct?
A That's correct.
Q And nothing that you've testified about here today has anything to do with the question of whether Sprint's messaging servers are part of its cellular network or external to its cellular network, correct?
A I don't know if it has to do with it, but I am not offering opinions about whether it's internal or external or whichever specific words you just used.
Q And you haven't offered any such opinions to the jury during the course of your testimony here today, correct, sir?
A That's right.
Q And in fact you're not rendering any opinions at all on whether the '870 Patent has been infringed by Sprint, right?
A That's right.
MR. FINKELSON: I have no further questions for this

witness, your Honor.

MR. GOETTLE: No questions, your Honor.

THE COURT: That concludes your testimony, Dr. Dwoskin. Thank you.

THE WITNESS: Thank you.

(Witness excused.)

MR. GOETTLE: Your Honor, Comcast would like to read unobjected-to admissions from Sprint into the record. I think it's -- they're very short.

THE COURT: You may do so.

MR. GOETTLE: Ms. Papastephanou is going to do that reading.

THE COURT: Let me explain this procedure. As with discovery, each side can ask the other side to admit things, they're called requests for admissions, and we're going to hear requests for admissions from Comcast addressed to Sprint.

You may proceed.

MS. PAPASTEPHANOU: Good afternoon, your Honor. Stephanie Papastephanou for Comcast.

The two admissions are: "Sprint admits that Sprint first used the SPS on or about November 1st, 2010 for SMS. Sprint admits that Sprint first used the SPS on or about November 1st, 2010 for MMS."

Thank you.

THE COURT: Thank you.

MR. HEIST: Your Honor, Comcast calls Michele Riley.

THE DEPUTY CLERK: Please raise your right hand.

MICHELE MCCLURE RILEY, Plaintiffs' Witness, Sworn.

THE DEPUTY CLERK: Please be seated. Please state your full name and spell it for the record.

THE WITNESS: My name is Michele McClure Riley, M-i-c-h-e-l-e M-c-C-l-u-r-e R-i-l-e-y.

DIRECT EXAMINATION

BY MR. HEIST:

Q Where do you live, Ms. Riley?

A I live in Silver Spring, Maryland.

Q And what is your role in this case?

A My role in this case is to determine damages adequate to compensate Comcast assuming a finding of infringement by Sprint of the '870 Patent.

Q And by whom are you employed?

A By employed by Stout Risius Ross, which is a financial and economic consulting firm. I lead our Washington, DC office and the firm has just over 400 employees in 15 offices across the country. I also lead the firm's intellectual property practice and within my group we have 30 professionals, and we help clients with any issues that might arise at the intersection of finance and IP, intellectual property.

So a large part of my practice involves working in litigation matters like this one and coming in and giving expert testimony regarding damages. And we also provide valuations of intellectual property, we help with transactions, and we also work in compliance areas where we're making sure that licensees are being -- are paying appropriate amounts under the terms of license agreements for intellectual property.

MR. GOETTLE: Your Honor, excuse me, I'm sorry for interrupting, it looks like the screens might not all be on and I don't know if the jurors' screens are on.

(Pause.)

THE COURT: All on now, ladies and gentlemen? Thank you.

BY MR. HEIST:

Q Ms. Riley, for how long have you been doing financial consulting in intellectual property cases?

A I've been working in this field for almost 20 years. For five of those years I was working part-time when I was home with my kids, but straight across for 20 years.

Q Is your compensation in this case or the compensation of your firm affected in any way by the outcome of this case?

A No, it's not.

Q Could you please tell the jury your educational background?

A Sure. I have a Bachelor's degree in physics from Emory University in Atlanta and a Masters Business Administration with a finance concentration from the University of Maryland. I'm also a certified public accountant and a certified fraud examiner.

Q Are you a member of any professional societies that are relevant to this case?

A I am. I'm a member of the American Institute of Certified Public Accountants, which is my CPA governing body, and as it relates to intellectual property I'm also a member of the Licensing Executive Society, as well as Intellectual Property Owners.

Q Do you have any publications in your field?

A Yes, I've written and lectured as well on IP issues, mainly in the damages and valuation area. I also coauthored a book on patent damages.

Q And how many times have you given testimony either at trial or deposition in patent cases like this one?

A Approximately 60 times.

MR. HEIST: Your Honor, I offer Ms. Riley as an expert in the field of damage analysis in patent cases.

MR. RIOPELLE: No objection, your Honor.

THE COURT: And as with the prior expert witnesses, we will accept Ms. Riley as an expert on damages issues in patent cases. The instructions I just read to you covering

expert witnesses apply as well to Ms. Riley as an expert witness.

You may proceed, Mr. Heist.

MR. HEIST: Thank you, your Honor.

BY MR. HEIST:

Q When were you first engaged in this matter?

A I was engaged in early 2015.

Q And what were you asked to do?

A I was asked to review the case record and perform a calculation of damages adequate to compensate Comcast, assuming a finding of infringement of the '870 Patent.

Q And how much time have you spent on this matter approximately?

A Between myself and others on my staff who've been working on the case for the past two years we've spent probably in the area of 1600 hours working in reviewing a lot of documents and preparing expert reports and getting ready to be here today to discuss the case with you.

Q What type of information did you review?

A Well, the next slide has a listing of the materials. I reviewed in total around 35,000 pages of documents, a lot of it produced by both parties, but deposition transcripts of all the individuals listed, legal pleadings from both parties; as well as business records from Comcast and Sprint, so that would include planning documents, customer surveys,

market assessments; financial and accounting records, a lot of which went into forming my opinion regarding damages from Sprint, a lot of Sprint's accounting records. And then I also reviewed expert opinions, some of the people you've already heard from, some of the people you'll hear from next week that were in the case records, so reports and deposition transcripts.

Q Let me take a look at Slide 4, Plaintiffs' Demonstrative 4.5, can you tell us what that is?

A This is a listing of exhibits that support my damages opinion.

MR. HEIST: Your Honor, most of these exhibits were admitted with the omnibus motion, there are a number: Plaintiffs' Exhibits 707, 710, 711, 714, 715, 718, 719, 722 and 723, 726, 727, 730 and 731, 734, 735, 738, 739 and 742, as to which I understand there are no objections and I'd like to move the admission of all of the exhibits that I just mentioned at this time.

THE COURT: Well, you've only mentioned some of the exhibits on the screen.

MR. HEIST: Your Honor, the others that I didn't mention are already admitted, as I understand it, as part of the omnibus motion, and I have a binder that has all the exhibits that she --

THE COURT: Well, I think we're having a little

difficulty tracking the exhibits because of the way you've numbered them. First of all, your -- there's no objection?

MR. RIOPELLE: No, your Honor.

THE COURT: Fine. So the exhibits just identified by Mr. Heist are received in evidence.

(Plaintiffs' Exhibit Nos. 707, 710, 711, 714, 715, 718, 719, 722, 723, 726, 727, 730, 731, 734, 735, 738, 739, and 742 received in evidence.)

THE COURT: Counsel are responsible for keeping track of the exhibits received in evidence, but because of the way you're moving from an exhibit to the slide deck and using pages of the slide deck I think we might have a bit of a problem. So I want to address that now by telling you I want you responsible, you're going to be responsible for creating your exhibit list and tracking the exhibits. Michael will track the exhibits as well, but I can't help but think that he might have a difficult time because of the way that the exhibits are being used.

MR. HEIST: Comcast will do that, no problem, your Honor.

THE COURT: Fine. We'll need a list. I think Sprint asked us for a list of exhibits and we're having a little difficulty tracking them all; that is not good. So you're responsible and to the extent that we can help, Michael and I have a list as well, we will help in that

regard, but we'll take your word for it, Mr. Heist, that all of the exhibits on the board that you did not identify specifically are already in evidence.

MR. HEIST: Your Honor, I give you my word.

THE COURT: Good.

MR. HEIST: And I will have to take the word of somebody who gave the list to me and I'll make sure that they're right.

(Laughter.)

MR. RIOPELLE: Oh, that sounds like hearsay, your Honor.

(Laughter.)

THE COURT: Yes. We'll proceed.

(Pause.)

BY MR. HEIST:

Q Now, were you in the courtroom throughout this case?

A Yes.

Q You've been here for the entire trial?

A I have.

Q Now, could you tell the jury as your understanding, what is the measure of damages in a patent case like this one?

A Well, the measure of damages in a patent case like the one we've been hearing about is going to be given to you as you -- by the Court when you start your deliberations and I've printed here on the slide these instructions. So you

can read on the slide, "The damages you award must be adequate to compensate Comcast for the infringement and Comcast is entitled to recover no less than a reasonable royalty for each infringing act."

So this is how you'll be instructed at the conclusion of the case before you start deliberating as to how you determine damages.

Q Now, in the opening statements there was mention of the fact that Comcast itself doesn't practice the '870 Patent; is Comcast in your understanding entitled to a reasonable royalty even though it doesn't practice the patent?

A Yes, it is.

Q Now, what is a royalty?

A Well, a royalty is what you pay for the right to use the patent. So the slide shows kind of in a pictorial form, similar to a lease for real estate where you sign the lease and you get to use the building as you wish in exchange for a lease payment, you would sign a patent license agreement and pay a royalty for the right to use the patent. So that's what a royalty is, it's just a payment for the right to use the patent.

Q And we saw the what we understand will be the Court's instructions on the law; what is a reasonable royalty?

A A reasonable royalty is addressed again in the jury instructions that you'll receive from the Court and it's

defined as "the amount of money Nokia and Sprint would have agreed upon as a fee for use of the invention at the time prior to when infringement began." And use of the invention is highlighted there because that's a requirement of the law that we consider use made of the invention in determining the reasonable royalty, so I'll be discussing that with you today.

Q And what -- how is a reasonable royalty determined?

A Again, an excerpt from your instructions: "A reasonable royalty is the amount of royalty payment that a patent holder and the alleged infringer would have agreed to in a hypothetical negotiation taking place at a time prior to when the infringement first began."

So that's how we determine the reasonable royalty by putting the patent owner and the infringer together in a hypothetical negotiation, it didn't occur in real life, it's occurring here in the context of court, in litigation, and they're going to come to an agreement as to what should be paid.

Q So when you say it's a hypothetical negotiation, it's not something that actually took place, correct?

A It did not, that's correct.

Q But the law assumes that it did?

A Yes.

Q Are there any ground rules that must be followed in

considering this hypothetical negotiation?

A Yes. So the next slide has the ground rules that I keep in mind as I conduct the hypothetical negotiation. And you can see here at the table we have the parties who are going to sit down and do the negotiation, and it's Nokia, who owned the patent in 2005, and Sprint as the licensee or infringer.

So you can see there the date of the negotiation. The first ground rule is when the parties would be talking and it is the date of issuance of the '870 Patent. And you've heard a number of times that that was April 26th, 2005 and as of that date Sprint was already offering two-way messaging, so the infringement had already commenced as of the issuance of the patent. So that's when the parties sit down, it's the date of first infringement and they sit down at the table.

Another of the ground rules is that the parties agree that the '870 Patent is valid and infringed. And this is an important ground rule. This is unlike negotiations in real life, but the law tells us to make this assumption as we conduct the hypothetical negotiation. So the parties have agreement that the patent is valid and infringed.

Another ground rule is that the parties have perfect information. I always like to say that they can read each other's mind or that they're playing cards with their cards face-up, you know, they can see each other's hand, if you

will.

And then finally the last ground rule is that Sprint needs a license. In other words, neither party can push away from the table and say I'm not doing a deal, they have to come to an agreement, it's a requirement of the hypothetical negotiation under the law.

So those are our grand rules for this negotiation.

Q Do you know if Sprint's damages expert agrees with the ground rules?

A Yes. I attended Dr. Cox, he's Sprint's damages expert, I attended his deposition and he and I are in agreement about I think most of these ground rules.

Q Now, what is the first date for which damages are due in this case if the jury finds that Sprint has infringed the patent and that the claims are not invalid?

A Well, under the law, I think again we have more from your jury instructions, so you'll see this when you begin deliberating, "damages are limited to a period of six years prior to the filing of the lawsuit." And in this case Comcast filed the lawsuit against Sprint on February 17th, 2012. So the earliest date of commencement for damages that Comcast may collect against Sprint is February 17th, 2006. So that's the beginning of the damages period.

Q And what is the end date for which Comcast is seeking damages in this case?

A The end date is September 30th, 2016, that is the last date that I've seen information from Sprint regarding Sprint's messaging volumes.

Q Have you prepared a time line to illustrate the key dates that we should keep in mind in considering the damage issues?

A Yes.

Q And is this the time line?

A Yes. So this time line just lays everything out for you again visually. You've heard about the priority date, the filing date of the '870 Patent in the 1999 time frame. Sprint then launched its two-way SMS in 2004. The patent issues April 26th, 2005, that's the date the parties sit down to conduct this hypothetical negotiation. And then our damages period is from February 2006 through September 2016, and of course Comcast purchased the patent from Nokia in June of 2010. So just a visual of everything you've heard about.

Q Now, when does the damages period begin according to your calculations for MMS? This is for SMS, right?

A Yes. For MMS the damages began in May 2014.

Q Now, when does the '870 Patent expire?

A The '870 Patent expires in 2023.

Q Is Comcast seeking damages in this case at this time for acts occurring after September 30th of last year, 2016, and 2023?

A No, that would be an issue for another time. We only

have information regarding Sprint's use of the patent through September 30th, 2016.

Q Now, are you saying that Comcast is entitled to damages in this case even -- if there's infringement even for the period in which Nokia owned the patent before Comcast purchased it?

A Yes. According to the purchase agreement -- and you've actually already seen this document on the next slide a couple documents -- Comcast obtained from Nokia all rights to bring any cause of action in pursuit of any damages, including pursuit of royalties for past infringement. So that's PX-7 of the purchase agreement when Comcast bought the '870 Patent.

Q Ms. Riley, I think you're referring to Exhibit B, the confirmatory assignment?

A Yes.

Q Right. I think it was an attachment to the (indiscernible) I'm not sure, but it's Plaintiffs' Exhibit 7. Is that what gives Comcast the right to collect damages for the period before which Comcast actually owned the patent?

A That's correct.

Q Now, assuming that the '870 Patent is both valid and infringed, have you formed an opinion as to what damages should be awarded to Comcast for Sprint's use of the invention during the damage period?

A I have. The damages, reasonable royalty damages for Sprint's use of the '870 Patent during the damages period are $153,634,905.

Q How did you determine that amount?

A That amount is determined, you've heard some of these numbers already and I'm going to give you an overview and we're going to go through this in some detail. So you will understand how the calculation is performed. But the number generally speaking is determined by multiplying the number of SMS messages which is 2.66 trillion by the royalty per message that I determined which is 0.00561 cents.

So the way that, you know, there's a lot of decimals and a cent sign there, so to the extent you haven't seen one of those lately, the way to think about it is is the royalty per message would be as if you divided a penny into 100,000 equal pieces and the royalty would be 561 of those pieces. And that would be for the SMS messages.

For the MMS messages there are 61.5 billion infringing messages, and the royalty per message there is 0.00660 cents per message. And again dividing the penny into 100,000 pieces, 660 of those pieces would represent that royalty per message.

Q Now, we see the word trillion there and we hear a lot of talk about the word trillion, but usually in conjunction with the national debt. You don't often hear it otherwise. Could

you tell the jury how big a trillion is.
A Well, a trillion is a one followed by 12 zeroes, as you can see there on the right of the slide. It's a thousand billions or a million millions. I mean there's different ways to express it. But I wanted to demonstrate here the number of zeroes behind the one and also read the number of messages Sprint sent and received for the record so we have 2,666,181,906,857 SMS messages and 61,546,969,626 MMS messages.
Q Now how if at all does a hypothetical negotiation that would have occurred between Nokia to Sprint in April of 2005 differ from an actual negotiation for a license agreement?
A I touched on some of these differences previously when I was telling you about the ground rules of the negotiation. So the first major difference is that in the hypothetical negotiation the parties agree the patent is valid and infringed. That's never the case in a real world negotiation. There's always, you know, questions regarding validity and infringement of whatever the patent is that the parties are talking about. So that's a major difference.

Another major difference is that Sprint has to take the license so the parties can't walk away from the negotiation as they might in the real world. They have to sit there until they come to an agreement.

And then finally a difference in the hypothetical

negotiation from a real world negotiation is that they know, the parties know, that Sprint's use of the invention will grow significantly during this damages period and that it would realize more than $9 billion is messaging profits during this damages period. So that's part of this perfect information that the parties have. They're aware of this fact as they sit down to negotiate. And that's very different from a real world negotiation because you don't know the future when you're, you know, not in a hypothetical negotiation.

Q So how did messaging grow?

A Well, messaging grew across the industry at a significant rate. I have a chart here from the report I prepared in the case. So this is industry message traffic volume for all the carriers including Sprint, and you can see in the 2005 time frame there are 82 billion messages that doubled by 2006 to 161 billion. And you can see our data, the hypothetical negotiation is in between those numbers and then growing very rapidly up to 2.3 trillion by 2011. And this information is taken from a Federal Communications Commission study of messaging.

So the parties would be aware because of this concept in the hypothetical negotiation of perfect information, they would understand that the use of messaging would grow, as we all know looking backwards that it has

grown.

Q So let's consider the situation of the two parties to the hypothetical negotiation on April 26, 2005, and think back to that room. What was Nokia's situation as it walked in the door?

A Nokia's situation as it walked in the door was positive. At that point in time it was the world's largest manufacturer of phones, enjoying very healthy profitability levels.

Q What was Sprint's situation?

A Sprint's situation in 2005 was also rosy, positive. It had just closed its merger with Nextel which was a $36 billion merger, so it was looking to operate on the combined platform with the IDIN and CDMA networks.

Q And what was Sprint's growth in messaging over the damage period? How did it compare to what we saw in the industry?

A It's similar to what the industry experienced. So I had from Sprint in the documents I reviewed, the next slide has a chart similar to the industry chart that shows Sprint's message traffic volume during the 2006 to2011 period. So you can see that the growth rate is very similar to that of the industry as a whole. You know, more than doubling in that 2006-2007 period and getting up to that 377.8 billion messages in 2011.

Q Now, focusing on the two parties at this hypothetical negotiation, Nokia and Sprint, what are the ways in which

they might have considered what an appropriate, reasonable royalty would have been had they met at that time?

A There are standard valuation approaches that we can use in determining the royalty. And these are approaches that would be applicable to any asset. And they're called the income approach, the cost approach and the market approach. So this is from the financial literature where the income approach, the first, number one, values the patent based on expectations of profit that would be generated by the infringer's use of the patent.

And in the second the cost approach values the patent based on the fact that the infringer would not pay more for a license than the cost of its next best alternative. And then finally the market approach values the patent based on comparable transactions between unrelated parties or parties at arm's length.

Q Let's work from the bottom of the slide up. Is there an appropriate measure of damages in your opinion under the market approach?

A No, there is not. There is no comparable transactions that would be – that could be considered for forming a reference point under the market approach.

Q Well, did you hear Sprint's counsel in the opening saying that you failed to account for a comparable transaction, namely the purchase price Comcast paid for the '870 Patent?

A I did hear that.

Q Did you consider it?

A Yes. So the next slide shows my consideration of the purchase agreement that we've heard about from 2010 and so I've prepared this to demonstrate the differences, why this is not a comparable agreement, not comparable to our hypothetical negotiation. So first and foremost we have again the ground rule, the understanding in 2005 that Sprint and Nokia knew the '870 Patent was valid and infringed. In 2010 I haven't seen any evidence that would indicate Comcast and Nokia had a similar understanding or agreement. So that's a really big difference that makes this 2010 agreement not comparable to the hypothetical negotiation.

Secondly, in 2005 the parties sit down to that table to do the hypothetical negotiation and they understand that Sprint is using this patent and would be using it extensively in the years to come and it had to take the license. That's our ground rules for the negotiation.

In 2010 when Comcast and Nokia did their negotiation in real life, Comcast was not going to use the patented method. You heard Mr. Dellinger, Mr. Marcus talk about Comcast's use of its patents defensively. So it's not going to enter the texting space using this patent. So Comcast didn't have to take the license in furtherance of its business.

And finally in 2005, as I just said, Nokia was doing quite well, had a good financial position. Unfortunately by 2010 its financial position had significantly deteriorated. It had almost a very small market share in the United States in phones. It did have profitability in 2010 but turned to losses for 2011, 2012, 2013 and then Nokia sold its phone business to Microsoft for I believe $7 billion in 2014. And as Dr. Akl indicated this morning, that ended up Microsoft ultimately sold that business for $350 million in 2016. So Nokia in 2010 had entered a very stark downward trajectory as compared to 2005.

Q What products, was there a product launch between 2005 and 2010 that in your view had a impact on Nokia?

A Absolutely. The I phone was launched in '07 and Nokia unfortunately missed the smart phone revolution, you know, the Android and IOS operating systems just hastened Nokia's demise.

Q Okay. So in your view there were no comparable agreements in this record to apply the market approach?

A That's correct.

Q How about the cost approach? Is there a reasonable measure of damages in this case using the cost approach?

A According to my conversations with Dr. Akl who you've heard from there are no commercially available - commercially acceptable non-infringing alternatives available to the '870

Patent. So there's no relevant measure of damages under the cost approach.

Q So what approach do you believe is applicable in this case?

A The income approach. So that's our last remaining approach where we're going to be – and that's how I performed my calculation of damages. So we'll be looking at profitability generated by Sprint's use of the patent.

Q So give us an overview of how you modeled this in a reasonable royalty using the income approach.

A So big picture we have to look at only – we want to look at profits that are attributable to the '870 Patent as compared to other services that Sprint offers. So I'll walk you through my determination of damages, and we're going to focus on revenue earned that's related to the '870 Patent, and then we'll also look at profitability and segregate out profit on messaging as compared to Sprint's other business line so that you'll see the extra profit Sprint earns on messaging. And then we'll focus on what portion of that extra profit is attributable to the '870 Patent. So we have to be very focused on the '870 Patent, the benefit that Sprint receives from a financial perspective through its use of that patent. So I'll go through the steps of the calculation, but that's a very high level view of what I've done.

Q So let's go through the various steps that you went through in making that calculation, looking at slide 24 of your slide deck. Could you go through the steps and then we'll take them one by one.

A Sure. The first step is to determine the apportionment percentage applicable to the '870 Patent. And then we're going to calculate the apportioned revenue per message focused again on the patent. Third, calculate the apportion royalty rate. Fourth, calculate the royalty per message and finally calculate the total reasonable royalty damages.

Q And I see in three of those steps you use the word apportion or apportionment. And I suspect that's not a term that everyone in the room is familiar with. So why don't you explain what apportionment is and why you think it's appropriate and may be necessary in this case.

A Sure. So this slide shows first step, determine apportionment. And you can see down at the bottom of the slide I have it what apportionment is. So apportionment is in orange. And this goes to separating the value of the patented steps in Sprint's process for sending and receiving messages from the value of the unpatented steps. So we need to focus on what the patent contributes to sending and receiving messages as compared to everything else, what everything else contributes. And that's an acknowledgment that not all of Sprint's messaging revenue and profit is due

to this infringement of the '870 Patent. And so because the invention covers only part of the process for sending and receiving messages I have to perform this apportionment. So again it's that focus on the '870 and the revenue and profit associated with the use of the patent.

Q So let's go to the next slide and tell us how you did or applied the apportionment percentage. I guess t he question is how did you determine the apportionment percentage?

A Well, you've heard about this already today about Dr. Akl. So I asked Dr. Akl to determine from the call flow diagrams that you've seen which steps infringe the '870 Patent and which don't. And he went through some of this already. So just reading through the slide we have infringement of claims 1 and 7 which utilize the MLDAP or SPS and the HLR. These are for received SMS messages as you can see at the top of the slide. So this is for a message from the intercarrier Gateway 2, a Sprint subscriber. Four out of nine of those steps infringe. So I divide four by nine and that gives me 44 percent.

And then you move down a row. Claims 1 and 7 utilizing the MLDAP or SPS plus the HLR for a message received by a Sprint subscriber sent from a Sprint subscriber. Four out of seven of those steps infringe. And doing that division gives me 57 percent.

So in order to combine these percentages together I

took a look at Sprint's actual message traffic to determine what portion of messages are sent from the intercarrier gateway to a Sprint subscriber. So from another network, from AT&T or Verizon. And then what portion of messages are Sprint to Sprint. And I determined that 75 percent of Sprint messages come from AT&T, Verizon to a Sprint customer and 25 percent are Sprint to Sprint.

So I weighted the infringing step percentage based on that acknowledgment or that understanding as to how Sprint's message traffic breaks down. And that gives me the 47 percent weighted average on infringement of claims 1 and 7.

And then similarly I performed the same analysis for claim 113 utilizing the SPS for intercarrier gateway messages to a Sprint subscriber. Two out of nine of those steps infringe. That's 22 percent of the steps.

And for claim 113, utilization of the SPS Sprint to Sprint, two out of seven of those steps infringe, 29 percent, and applied the same weighting to get that. 24 percent weighted average of apportionment.

So again the percentages I'm talking about are the percentage of steps in sending the message that infringed the '870. So this is a quantification of Dr. Akl's analysis that he went through with you earlier.

Q Now we've been looking here at slide 26. That's for

received SMS messages. You did that process for sent messages, SMS messages as well?

A I did. The next slide has those numbers and it's a similar analysis again. Quantification of Dr. Akl's analysis of infringing steps and applying the weighted average based on 75 percent of Sprint messages coming from intercarrier gateway, 25 percent coming from other Sprint customers.

Q And that's on slide27?

A Yes, that's slide 27.

Q And then did you do a similar analysis with regard to the MMS messages received and sent?

A I did.

Q Let's look at the received messages. That's slide 28; is that right?

A Yes. This is received MMS messages, similar quantification, using the same methodology of Dr. Akl's infringing step analysis based on the call flow diagram that you saw coming to the weighted averages shown based on the different claims of the '870.

Q Let's look at slide 29, and tell us what that is.

A This is sent MMS. Similar methodology, quantifying Dr. Akl's analysis to determine the weighted average. Percentage of infringing steps out of the entire message process from the call flow diagram.

Q All right. So let's look at all of those weighted

averages together on slide 30. And could you tell us what's on slide 30?

A Taking all the weighted averages together for SMS and MMS, I listed them all here and I chose to apply in my analysis the apportionment percentage of 24 percent simply because it is the lowest percentage shown, so that's most favorable to Sprint in the analysis.

Q All right. So that's step one of your damage model, determine the apportionment percentage. And the percentage that you determine using the weighted average most favorable to Sprint is 24 percent?

A Correct.

Q All right. Let's go on to the second step.

THE COURT: I'm looking at the clock. I don't want to interrupt the witness as she is in the middle of "a step." How long will this next step take?

MR. HEIST: One slide, your Honor.

THE COURT: Takes care of that. (Laughter.) We're going to recess - I have something to tell the jury, so you have a few minutes.

MR. HEIST: This next thing will be just a second and then we'll break it, that's fine.

THE COURT: Fine.

BY MR. HEIST:

Q So the next step is calculate apportion revenue per

message. Could you explain how you did that?

A Sure. So we have the messaging revenue that Sprint has earned on SMS and MMS shown at the top of the slide. And this is again based on my analysis of the Sprint documents. So they've earned $17.226 billion during the damages period on SMS messages and $641.7 million on MMS.

So I have to determine the revenue per message, and I did that by dividing through by the total number of messages sent and received which I went over with you earlier. That's the 2.66 trillion SMS messages. So that gives me .85 cents revenue per message. So just less than a penny per message on SMS messages is what Sprint is earning and one cent per message on MMS.

Now, we need to be sure that we're only capturing revenue attributable to the use of the '870. So I go back to my quantification of Dr. Akl's analysis and I take my 24 percent which is steps that invoke the '870 Patent, multiply that by the revenue per message to get my apportion revenue per message. And that's shown on the bottom of the slide. For SMS messages it's .204 cents, and for MMS messages it's .240 cents.

So now we have the revenue for each message that's attributable to the '870. And that's the number shown at the bottom of the screen, the number shown, sorry, for the SMS and MMS messages. So I think that's where we're going to

stop.

THE COURT: Yes. Ladies and gentlemen, it's not quite 20 minutes after 4:00. Remember, we're recessing at 4:20 today. Hopefully we'll be able to sit a little later on Monday.

You sent me a note and I'm going to read it. You asked for clarification on instructions regarding not discussing the case. And you want to know if you're able to discuss general issues such as how the case is moving along, counsel, et cetera.

I've discussed that with counsel and it's been my practice to prohibit discussing the case at all. If you start discussing counsel, as an example, you're going to get into well, this fellow does it this way, not quite as good as the other fellow, or the women are doing it this way. And the bottom line, we think it best if you do not discuss the case at all. Is that an easy instruction to follow? No, it's hard. Human nature tells you you want to talk about the case. You're living it now for a week and you've got at least another week and more probably.

And the bottom line, I think it's best if you defer any discussion until after all the evidence is received, until after counsel have given their closing speeches and until I've charged you on the law. Then you can discuss anything that you deem appropriate, including counsel and all

of the other issues that are referenced in your request.

I'm also going to give you the usual day end instructions. I haven't seen any reporters in the courtroom, although a number of people have been in and out. If anything is printed in a newspaper that deals with the case, don't read it. If anything is broadcast on the radio or television, don't listen to it, don't watch it. And again do not discuss the case among yourselves. Do not discuss the case with anyone else. You're to hold off on your discussions till the end of the case. And as far as discussing the case with anyone else or reading anything about it or listening to anything about it or viewing anything about it, the reason is you've got to decide the case based on what you've heard and seen in the courtroom and not based on the spin which a reporter has put on the case.

With that, you've got a weekend ahead of you. Have a good weekend. I'm not going to say anything about the Superbowl. I want you all to go to bed early on Sunday night. (Laughter.) So that you can be here bright and early on Monday. We'll start at 9:30 on Monday morning. Have a safe trip. See you on Monday morning, 9:30.

I want to see juror in seat number five. So when the other jurors are excused to go into the jury room, I'd like you to come to sidebar.

DEPUTY CLERK: All rise.

(Jury exits the courtroom at 4:20 p.m.)

THE COURT: You may sit down if you want.

Be seated, everyone. Juror Number 5, why don't you join us at sidebar?

(Sidebar discussion at sidebar as follows:)

THE COURT: I understand you had a conversation with my deputy about your age.

JUROR NO. 5: Yeah.

THE COURT: Well, I'm pleased to report to you that you and I are probably the oldest people in this courtroom. I'm a lot older. As far as your mentioning that you're over 70, I haven't looked at our jury plan, but I believe people who are summoned for jury duty and who are 70 years of age and older can ask for an excuse before they end up on a jury. You're on a jury, and that rule does not apply.

In other words, you've been selected for jury service, you're eligible for jury service, you can be excused. You could have been excused if you'd mentioned this. But you're too young to be excused on account of your age. (Laughter.) So we're not able to excuse you. And the reason is you're on the jury, and we need all of you to decide the case. That's what the law says.

JUROR NUMBER 5: Okay.

THE COURT: And every juror plays a very important role in our legal system. So you're playing an important

role. It's tough. Following the evidence is difficult, but I know everyone is trying and I've watched you and you're trying.

So you have a good weekend and I'll see you Monday morning at 9:30.

Now, do you have any questions of me?

JUROR NUMBER 5: It's about my job. My employer isn't (inaudible), you know?

THE COURT: If you want me to write a letter. You work for Honda or a Honda dealership?

JUROR NUMBER 5: Yes, for Honda in West Chester.

THE COURT: I'll write a letter to your boss if you want me to do that.

JUROR NUMBER 5: No. I just don't stand, your Honor -

THE COURT: I'll tell him how important the case is though. I can do that for you. So on Monday bring me his name and address and I'll take care of that.

JUROR NUMBER 5: Thank you, your Honor.

THE COURT: Right. You have a good weekend.

JUROR NUMBER 5: You, too, your Honor.

THE COURT: And don't stay up too late on Sunday night watching the game.

SPEAKER: The game is at 6:30.

THE COURT: Oh, no, no, no. The Superbowl will start

at like 7:00 a.m. and will go to –

SPEAKER: Oh, right.

JUROR NUMBER 5: Am I excused now?

THE COURT: Good night.

SPEAKER: Thank you.

THE COURT: As far as exhibits are concerned I'm going nuts trying to figure out those numbers. I need slide decks, too, for the last of Riley's slide deck.

SPEAKER: They're copies.

THE COURT: The slide decks are going to be helpful. But the jury won't get the ones as slide deck helpful to Dr. Akl. I don't think we have to decide anything else.

If you need help with exhibits – Michael.

SPEAKER: We've got people tracking them, your Honor.

THE COURT: Michael, we're off.

DEPUTY CLERK: Off the record?

THE COURT: Yes.

(Court concluded for the day at 4:24 p.m.)

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CERTIFICATION

I hereby certify that the foregoing is a correct transcript from the electronic sound recording of the proceedings in the above-entitled matter.

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